TEACHER MEDIATION OF LINK-MAKING BETWEEN WHAT LEARNERS DO AND OBSERVE DURING PRACTICAL ACTIVITIES (THE DOMAIN OF OBSERVABLES) AND THE CONCEPTS LEARNT IN THEORY LESSONS (THE DOMAIN OF IDEAS)

Alois Mashinyira

A research report submitted to the Faculty of Science, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Masters of Science

Johannesburg, 22 February 2013

DECLARATION

I declare that this Research Report is my own, unaided work. It is being submitted for the Degree of Master of Science at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.

_____

(Signature of candidate)

_____ day of _____ 20_____ in _____

Abstract

Research suggests that effective teaching and learning of physical sciences for conceptual understanding involves link-making. Learners make connections between prior knowledge and new ideas and/or between ideas and experiences. Meanwhile the teacher mediates the process of meaning making for learners. My study examined how I mediated learner link-making between what they experienced during practical work and the concepts learnt in theory lessons. I wanted to understand how I help learners make links and explore ways of improving my mediation of link-making for my learners. The self-study research design was used for data collection and Scott, Mortimer & Ametller's (2011) concept of pedagogical link-making to support knowledge building was used to analyse the data. My findings show that I drew on the full range of pedagogical link-making approaches to promote knowledge building. However, I did not draw equally on all the approaches. There are six approaches to pedagogical link-making to support knowledge building: making links between every-day and scientific ways of explaining ; making links between scientific concepts ; making links between scientific explanations and real world phenomena ; making links between modes of representation ; moving between different scales and levels of explanations and analogical link-making. In all the lessons I used two of the approaches, making links between every-day and scientific ways of explaining and making links between scientific concepts while the other four were used less often. I drew some insights from my practice which could be shared with other science teachers. For instance, in planning their lessons, science teachers should think about how they will make links for their learners between their practical activities and the science concepts covered in theory lessons. They need to think about the most appropriate analogies and examples that can help learners make successful links between observations and science content knowledge. Teachers should be aware of specific concepts to target for the link-making so as to promote deeper understanding of the concepts.

Dedication

To my wife Elizabeth

To Ngoni, Tinashe, Tawananyasha, Tinotenda and Vimbai

Acknowledgements

I owe special thanks to my supervisor Audrey Msimanga for working tirelessly guiding, supporting and motivating me throughout the duration of my study.

I am grateful to my wife Elizabeth for supporting me emotionally, spiritually and for making many sacrifices. You are a wonderful woman.

Special thanks to my school principal, Ms MCJ Nortier for granting me permission to carry out the study at her school and for supporting me throughout the duration of my study.

I am indebted to my children and cousins Ngonidzashe, Vimbai, Tinashe, Tawananyasha, Tinotenda, Everson and Spiwe who gave emotional support.

I am most grateful to friends and colleagues, especially Dr Rwodzi for giving me emotional support.

Above all I thank God for giving me a vision and everything.

Table of contents